The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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The Technical Press

"FOUR hostile newspapers," said Napoleon, "are more to be feared than a thousand bayonets." The power of the Press has always been something which statesmen, politicians, and the private citizen alike have had to take into account whether in formulating policies or in regulating private codes of conduct. Armies, customs and times have changed since Napoleon's day and although the Press is shy of talking about itself, it is of some interest to consider what is likely to be the position and function of the technical Press in the future.

The technical Press differs from the daily Press in the specialist nature of its appeal, but it is governed by the same general economic factors which make it essential that in the first place it shall appeal to its readers and that secondly it shall come through that appeal to be regarded as a sound medium for advertising. Neither the daily Press nor the technical Press could exist if the subscriber had to pay the full cost of production, and thus a system has grown up in which the advertiser uses the Press as his salesman through its advertising pages, and in so doing permits his clients to purchase the paper at a much lower price than they would otherwise have to pay thus himself extending the range of his "printed salesman."

The technical Press, we have said, does not often talk about itself, but an exception to this rule is the paper which Mr. W. Rupert King, Editor of the *Gas Journal*, contributed (by request) to the recent meeting of the Institution of Gas Engineers. The principle therein set forth as the function of the technical Press is that of service to the industry with which the paper is concerned. Mr. King maintains that the paper should fearlessly assist the development of the industry "by criticism when necessary, by encouragement whenever possible, and by intelligent comment always." The kind of influence which the technical Press can have on the policy of an industry depends on that industry. The gas industry comprises a number of undertakings working more or less in collaboration in regard to the sale of gas and by-products; policies and even details of manufacture can thus be freely discussed. The chemical industry, on the other hand, comprises a number of manufacturing businesses which may be mutually competitive. In many branches of the chemical industry there are associations which take mutual action in support of common interests, but such free and public interchange of information and views are not necessarily possible in the chemical industry. The technical Press in the chemical industry, therefore, must exist to give news rather than views, and general, rather than specialised, technical information. Certain questions of policy, however, can be discussed, such as, for example, the interrelation of the Government with the chemical industry, the effect of proposed new legislation or Orders upon the industry, export trade, and so forth. As Mr. King points out, for these to be adequately discussed by the technical Press there must be ample interchange of information between Press and Industry, so that the leaders of the industry, whether as individuals or trade associations, should take pains to keep the Press informed as to what is going on and as to the reasons behind particular policies or movements. It must be confessed that this is not done to any extent in the chemical industry. It is too often assumed that information given to the Press will of necessity be published, whereas in practice, if publication is not desired, such information is kept as secret as the confessional and is used only to form a sound judgment upon events, so that comment shall be intelligent and in the best interests of the industry.

Conditions may have changed since Napoleon's day, but the power of the Press remains. Mr. King has a sentence that is worth quoting in this respect and which is equally true if for the word 'gas' we read 'chemical': "Let nobody who has gas interests at heart, just because he has grown up with his own Press always at his side and accepted it as a matter of course, underrate the influence that it can, and does, exert, in wider circles."

Published information is derived from two sources, one being the papers read before technical or scientific societies, and the other original papers contributed solely to a particular journal. It is recorded that as long ago as 1933 there were 14,000 periodicals published annually, containing some 750,000 scientific and technical articles. We have no doubt that after the war these figures will be further multiplied. It is impossible for the individual to keep himself informed about the valuable matter contained in these publications. But the technical Press, by a system of selection, of skilled condensation from published work, and by arranging for authoritative articles to be published on new developments, can do much to provide for the needs of all save the research specialists. The technical Press in the future will have to carry still farther this policy of condensation and selection and thus, coupled with its function as a newspaper, it will occupy a position of increasing importance in industry.

NOTES AND COMMENTS

Chemists Help in Urgent Work

CHEMISTS are as eager as anyone to use their skill for the benefit of the nation in its hour of need; perhaps particularly eager, indeed, since research carried out with the avowed aim of solving merely a war-time problem has often turned out to be of fundamental importance to the science as a whole. At all events, the purblind meanderings of the Central Register in its efforts to employ scientists on work of national importance have not satisfied the urge of the chemists to lend a skilled hand; and now the Chemical Society (as detailed elsewhere in our columns) is giving its powerful support to a new scheme for the provision of fine chemicals which would be impossible to secure by other means. For one reason or another—stoppage of imports, diversion of man-power, etc.—the commercial manufacture of certain fine chemicals has of necessity ceased in this country; and some of these products are of national and urgent importance. Where both these conditions are present, chemists with the requisite tools and skill at their disposal have volunteered to provide their services free for the manufacture of the products concerned. A committee of the Chemical Society, working hand in hand with the A.B.C.M., will ensure that the articles are both unobtainable commercially and nationally important. This is an excellent scheme indeed; is it too much to hope that the collaboration of United States chemists could be sought in some degree at some date not too far ahead?

Post-Graduate Lectures

DR. H. W. KEENAN, chairman of the Oil and Colour Chemists' Association, makes an announcement of considerable interest to all industrial chemists in the current issue of the Association's *Journal*. Envisaging a post-war state of affairs in which it will be necessary for a nation to compete in world markets as a single co-ordinated unit, the Committee of the London Section of the O.C.C.A. have outlined a scheme of post-graduate lectures, as a step towards the general education of industry in the realisation that a scientific outlook towards industrial management is beneficial to the working community as a whole. The basic idea is to enable the working chemist to keep abreast of chemistry—a difficult enough task, in all conscience; and the complete scheme, if support is forthcoming, would be organised on a periodic basis, for example, a five-year course of four lectures a year. The first year might be devoted to recent advances in Inorganic Chemistry, the second to Organic, the third to Physical, the fourth to Colloid, and the fifth to special branches of the science. The lectures would be delivered by eminent authorities holding university appointments, and would be open, on payment of a fee, to any chemist introduced by a member of the O.C.C.A. In order to test the response of members to the scheme in general, the Committee has decided to proceed at once by organising two lectures on Inorganic Chemistry. Oil-and-colour chemists will know how to act, and other industrial chemists, we would respectfully urge, should lose no time in getting into touch with their friends in that line of business.

Miracles of German Chemistry

CRITICISM has often enough been levelled at British methods of propaganda; particularly at our efforts to create a favourable impression among our friends in the United States. All the more refreshing, therefore, is it to see unmistakable signs that U.S. citizens do not swallow German propaganda quite so readily as some of our depreciators try to make out. The German Library of Information, New York (now, presumably, liquidated by President Roosevelt), recently published "Werkstoffe, Miracles of German Chemistry," an attractive 30-page booklet reviewed in the May issue of *Chemical and Metallurgical Engineering*. Some of the reviewer's comments are worth quoting. "Few chemical readers," he says, "will be fooled by its fallacious statements, but it is irritating to find them being accepted by otherwise well-informed laymen"—it is indeed, when the book is circulated widely to teachers, librarians, and public officials. However, the Germans, as usual, give their own game away: "Where Germany has led," says the preface, "the fact is reported calmly and proved by statistics. Where other countries have led, their victory is conceded." Nothing could be more apt and concise than the reviewer's comments on this, viz.: "Says who?" and "Oh, yeah!" Germany, we are told, was successful after 25 years in finding "the first spun-fibre made from coal and limestone," *i.e.*, Pe-Ce fibre. Not a word, you notice, about Nylon or Vinyon. Furthermore, "the oldest Werkstoffe based on the synthetic resins, Bakelite, originated in a Germany factory. Bakelite is a purely German material, produced from the by-products of the distillation of hard coal and wood, phenol and formaldehyde." Here we cannot refrain from quoting the reviewer at length: "If that is true," he writes, "this little book is purely German material produced from the by-products of the imagination of synthetic propagandists, and should be preserved in phenol and formaldehyde in Dr. Baekeland's museum of chemical curios."

Axis Oil Shortage

FACTS and figures quoted in the German lay Press are automatically suspect, but the technical Press is in a rather different position, and it must be supposed that even in Germany a certain regard for the truth in the technical Press is essential, if that Press is to continue to exist at all. Therefore, a discussion on the current mineral oil situation in the German petroleum Press, referred to by *The Times* correspondent "on the German frontier," is not altogether unworthy of consideration. It appears, as we have long suspected, that oil production in Axis-controlled Europe is inadequate to the Nazis' present purpose. Germany, therefore, plans to increase the production of mineral oils both by synthesis and by well-boring, particularly in Poland. Italy undertakes to intensify Albanian production, to erect a new plant for synthesising lignite, and to utilise more methane, wood spirit, and barley alcohol. Rumania is expected to intensify boring in oil fields and to develop new wells in Moldavia and Wallachia. Rumania's "chief" difficulty is stated to be the need for American machinery, since new sources could not be reached except at great depths, but the development of the war with Russia has created newer and more urgent problems there. Prospecting is going on in Hungary, Croatia, Slovakia, Greece, and Bulgaria. Open discussion on so delicate a topic amounts to a tacit admission of increasing difficulty in maintaining war-time supplies and distribution. Assertions by Axis experts that war supplies could be maintained at the necessary level if the question of cost was ignored merely reinforce indications of a shortage.

White Lead Development

Combined Selling Organisation

A DEVELOPMENT of interest to users of white lead has taken place between two of the most important non-combine manufacturers, according to a report issued by Sir S. W. Royse & Co., Ltd., 20 Albert Square, Manchester, 2. For some years they have been selling exclusively the "Robroy" Brand, manufactured by Messrs. Robinson Bros., Ltd., Oldbury, Birmingham. Henceforth, however, they are also to be entrusted with the sole distribution of the "Yorkshire" Brand of White Lead, manufactured by Yorkshire White Lead Works, Ltd., of Leeds.

The object of this combined selling organisation, which came into operation on July 1, is primarily to assist in overcoming current difficulties of transport, etc., but other advantages will accrue, such as the pooling of technical data, etc., by which the user will be assured of finest quality products obtainable at attractive prices, neither the manufacturers nor the distributors being tied to any price control arrangements.

SOCIETY OF CHEMICAL INDUSTRY

Annual Meeting—Presentation of the Society's Medal

THE 60th annual meeting of the Society of Chemical Industry was held on July 8 in the rooms of the Royal Institution, Albemarle Street, London, under the chairmanship of the retiring President, Professor J. C. Philip, O.B.E., F.R.S. As last year, the whole of the proceedings occupied only about three hours instead of the five or six days customary in peace-time.

At the outset, Professor Philip announced that the Council had nominated Dr. William Cullen to succeed him as president. He put this to the meeting as a formal proposition and it was carried with acclamation. Professor Philip went on to state that the Council had re-elected Dr. L. H. Lampitt as hon. treasurer, in which capacity he had served them so faithfully and so well, and Dr. Cullen would be succeeded as Hon. Foreign (Overseas) Secretary by Mr. Stanley Robson. The speaker (Professor Philip), Dr. H. E. Cox, Dr. T. H. Durrans and Lieut.-Col. F. M. Potter had been nominated by the Council as vice-presidents to succeed Lord Leverhulme and Messrs. H. V. Potter, S. Robson and H. W. Rowell, while to fill vacancies on the Council, caused by the retirement of Dr. H. E. Cox, Professor W. M. Cumming, Lieut.-Col. F. M. Potter and Mr. J. S. Towers, the following had been nominated: Mr. A. L. Bacharach, Dr. J. H. Bushill, Dr. J. B. Firth and Mr. Foster Sproxton.

All these nominations were approved by the meeting.

The annual report of the Council, copies of which were circulated, stated that the following changes in the officers of sections and groups would take place immediately after the annual meeting:—

Section or Group	*Retiring Chairman*	*New Chairman*
Edinburgh	Prof. J. Kendall	A. P. Mieras
Glasgow	James Simpson	W. H. Nuttall
London	Dr. T. H. Durrans	Dr. A. J. Underwood
Manchester	Dr. W. J. S. Naunton	S. A. Brazier
Montreal	J. S. Rovey	Dr. R. S. Jane
Nottingham	H. Calam	A. D. Powell
Ottawa	P. Larose	D. C. Greaves
South Wales	J. Christie	F. S. Kernick
Toronto	Prof. R. R. McLaughlin	W. A. Davidson
Plastic Group	Austin Lowe	Dr. G. S. Whitby
	Retiring Secretary	*New Secretary*
London	R. Taylor	T. W. Jones

Commenting on the main points of the annual report, the general secretary, Mr. H. J. Pooley, said it was pleasing to note that the membership of the Society at the end of December, 1940, showed a decline of only 77 in comparison with a year previously. This was a tribute not only to the loyalty of the members, but to the importance of the Society's work. The total number of members at the date stated was 3920. Among the list of 48 members who had passed from among them since the last report was presented were numerous famous names. He was glad to announce that Dr. B. D. Shaw, of University College, who was reported as missing while on active service some months ago, was now known to be alive—he was a prisoner of war in Germany. Mr. Pooley went on to praise the local sections for the way in which they had overcome difficulties in travelling, catering, etc., and for extending their programmes in order to make good the interruptions caused during the winter months. He also alluded to the fact that the Society's offices had twice been bombed, and he praised the staff for the splendid way in which they had carried on under difficulties. They had been accommodated at short notice at the Royal School of Mines, and hoped to return to their own offices at the end of August. The report was approved on the proposition of Professor Philip, seconded by Mr. H. M. Ridge, who paid a tribute to the Council, the general secretary and the staff.

Dr. William Cullen, the new President of the Society of Chemical Industry

Presenting a financial report, Dr. Lampitt remarked that it was the first time in the history of the Society that an hon. treasurer had come before an annual meeting without a printed statement of accounts. He added, amid laughter, "When a ledger has been blown to smithereens, you will realise it is not easy to concoct a financial statement that will pass muster." Quite apart from such accountancy difficulties they had had a number of setbacks. They had expected that the income from the membership would show a decline of about £2500. The fact that the actual figure was £2300 was a compliment to the sections and groups who stimulated interest in the Society and kept it going. Thanks to the Council's decision to cut down abstracts, the proportion of income spent in that connection was 20 per cent. instead of the usual 26 per cent., and money had been put aside for what they called a Post-War Publications Fund. For the first time in a number of years income exceeded expenditure, there being about £400 to carry forward. In conclusion, Dr. Lampitt moved that in view of the circumstances that persisted in the past six months the final approval of the financial statement be postponed until the adjourned meeting at Burlington House on August 8 next at 4 p.m. This was approved after being seconded by Mr. A. H. Bennett, who expressed thanks to Dr. Lampitt for his services to the Society. After the auditors had been reappointed, a vote of thanks was accorded the officers and members of the Council on the proposal of Dr. J. H. Bushill, seconded by Mr. T. H. Gant.

Professor Philip's Address

Professor Philip began his presidential address by remarking that the horrors of war had brought home to them realisation of the fact that the prospect of easy times had, for the immediate future at any rate, simply vanished. Harder work and plainer living would be the lot of professional men especially, coupled, he hoped, with a real measure of discomfort for the idler and the parasite. The majority of the local sections and groups of the Society had continued to exhibit notable vigour and vitality in the face of serious difficulties. Generally speaking, evening activities had been out of the question during the winter, but early afternoon meetings had proved successful, there being excellent attendances and keen interest in the papers presented. It was a matter of regret to him that circum-

stances had prevented him from visiting the local sections during his tenure of office. The publications of the Society had been reduced in bulk since the outbreak of war. While this was due in a measure to financial considerations, the quantity of material available for publication was naturally smaller. Research activity had largely been diverted into other channels, and even where it had continued the subjects might be of a confidential nature.

One of the most significant events in the recent history of the Society, and in that of the chemical community as a whole, was the introduction, at long last, of a measure of practical co-operation between the three chartered bodies. Some of them had been getting impatient with the slow progress made in securing any agreement in a field marked out in 1935 by the formation of the Chemical Council, and some might be disappointed by the limited extent of the agreement now reached. Nevertheless, they could welcome the fact that the co-operation now developing represented a definite reversal of that divergence and sectionalism which had been all too prominent in the past. Lack of cohesion had been generally admitted, although the description of them as "a disunited rabble" went too far. The new developments gave them a fresh opportunity of repairing past failures and of promoting the corporate interests of the science and profession to which they were attached.

Work of the Chemical Council

Professor Philip went on to trace the origin of the idea that the Chemical Society, the Institute of Chemistry, and the Society of Chemical Industry, representing the scientific, professional and technical interests of chemists, should be more closely associated, and alluded to the launching and eventual abandonment of a scheme for the provision of central quarters, to be known as "Chemistry House." He then detailed the steps which led to the formation in 1934 of the Chemical Council. This was the successor in some respects of the Federal Council for Pure and Applied Chemistry, which between 1918 and 1935 functioned as a loose association of British chemical and kindred societies. The Chemical Council, though for the present less widely representative of chemical organisations than was the Federal Council, seemed to him more likely to effect practical collaboration. More recently the efforts of the Chemical Council, now under the chairmanship of Dr. Lampitt, had been directed to the evolution of a scheme aiming at the more equitable distribution of the financial burden of publications over the membership of the three constituent bodies. As was expected, it proved very difficult to achieve anything tangible on these lines, and it was only after patient and persistent effort on the part of the Chemical Council that a supplementary agreement and a scheme of co-operation had been approved by the three institutions. Provision had been made for financial support to the Bureau of Chemical and Physiological Abstracts from the funds at the disposal of the Chemical Council, though in the last resort the Chemical Society and the Society of Chemical Industry were jointly responsible for the maintenance of the Bureau. The Physiological, Biochemical, and Anatomical Societies had now become associated with the enterprise, and there seemed every prospect that the scope of the Bureau would be still further widened.

Proposing a vote of thanks to Professor Philip for his address, Dr. Cullen said he had carried out his office with great dignity, and during the two years of his presidency there had never been a word of friction between members of the Council and the Chair. He added that that evening Professor Philip was journeying back to his old university, where the honorary degree of LL.D. was being conferred upon him. The vote was carried with acclamation, and in acknowledgment Professor Philip remarked, amid laughter, that he hoped he had done something to dispel the legend of the absent-minded professor.

Following tea, which was taken in the Long Library by invitation of Professor Philip, those present reassembled in the lecture room for the presentation of the Society's Medal to Sir Robert H. Pickard, F.R.S., D.Sc., Ph.D., F.I.C. Professor Philip commented on the fact that the medal had been awarded every second year since 1896 for services to chemistry. In the opinion of the Council, Sir Robert Pickard fulfilled the necessary requirements. They all knew the services he had rendered to research and as a teacher of chemistry, and the magnificent work he had done more recently as Director of the Cotton Research Institute. It was due to his personal initiative that he had succeeded to a remarkable degree in harnessing hard-boiled Lancashire magnates to research. He had also rendered conspicuous service as the first chairman of the Chemical Council, and altogether was a very suitable recipient of the Society's Medal. Handing the medal to Sir Robert, Professor Philip expressed the hope that he had before him many more years of active service.

Address by Sir Robert Pickard

In reply, Sir Robert Pickard said he regarded it as a great honour to have his name added to the distinguished list of the Society's Medallists, and he much appreciated the honour. Sir Robert went on to deliver an address on "The Influence of Science on National Life," basing his remarks on his own experiences of the past forty years. He pointed out that before 1900 men of scientific attainments had had little direct influence on the living conditions of the people. In the late nineties few research chemists were employed in industry, but of recent years there had been a great increase in the employment of people who had received a scientific training. The membership of the Institute of Chemistry was five times greater now than it was in 1918. Doctors of Science were met with as often in industry as in the laboratory, while Doctors of Philosophy were almost three a penny," as the joke in *The Gondoliers* put it. The great increase in the popularity of ready-made clothing, with the consequent need for more perfect fabrics, was but one direction in which a greater number of scientists were being employed in industry. The number of people in business who were using statistical analyses was growing, and personally he believed that market research must play a prominent part in the maintenance of our present trade and the development of post-war trade.

Social Results of Science

There had been an enormous increase in the social results of the use of science in the past few decades. The purity of our water and gas supplies was now taken for granted, thanks to the scientist. Science had had a great influence in the development of cosmetics and the development of synthetic textiles. To the question, "Does industry revivify itself sufficiently by research?" he was inclined in the main to give an affirmative answer. At the same time, although this country still led the world in the older industries, he thought the scientists of the United States of America were making greater bulk endeavours in what might be called the newer industries. It could confidently be asserted that the beneficial influence of science on the life of the nation would continue.

A vote of thanks was accorded Sir Robert Pickard for his address on the proposal of Dr. E. F. Armstrong.

Professor Philip, handing to Dr. Cullen the presidential chain of office, said he was sure that out of the richness of his experience, Dr. Cullen would be able to guide the Society through difficulties, and he wished him a happy and successful year of office.

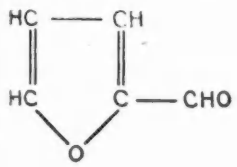
Dr. Cullen said he very much valued the great honour bestowed upon him. It was the first time a president of the Society had been instituted in that building, and it was rather remarkable that one Scotsman should follow another. In conclusion, Dr. Cullen expressed thanks to Professor Philip for his kindness in providing them with tea and to the managers of the Royal Institution for kindly allowing them the use of the rooms.

Furfural : Its Development and Possibilities

A Material for the Plastics Industry

by S. N. FARMER, Ph.D., A.R.C.S.

MANY vegetable tissues contain a considerable percentage of pentosans. The chemical units forming the basis of these are the anhydrides of the five-carbon sugars, such as xylose and arabinose, into which the pentosans may be converted by hydrolysis. On more drastic treatment these sugars yield furfural. The isolation of this liquid was first reported by Döbereiner in 1832 (*Ann., 3,* 141), who mistakenly regarded it as an oil, and termed it " artificial oil of ants." Although Döbereiner did not publish his preparation until 1832, it is probable that he first obtained it in 1821 (c.f. Döbereiner, *J. für prakt. Chem.,* 1849, *46,* 167; Stenhouse, *Phil. Mag.,* 1850, *37,* 226). The same substance was obtained by several investigators in the early half of the nineteenth century, and in 1845 Fownes (*Ann. 54,* 52), gave it the name " furfurol " (literally, " oil of bran.") It is a liquid, sp. gr. 1.16, b.p. 162° C. at ordinary pressures, straw-yellow when freshly distilled, and tending to darken with age. When the aldehydic nature became known, the name was changed to " furfural." Various structural formulæ were proposed for furfural, which was finally recognised as possessing the constitution of a doubly unsaturated heterocyclic aldehyde.



Such a compound would be expected to exhibit a high order of reactivity by reason of the aldehyde group and the two centres of unsaturation. It will be noted that, as in the benzene nucleus, the double linkages are conjugated. In fact, furfural, or, systematically, " furfuraldehyde," resembles benzaldehyde in many of its properties. On the other hand, it presents certain affinities to the aliphatic aldehydes. From furfural a series of derivatives can be prepared analogous to those obtainable from benzaldehyde, such as furfuryl alcohol and furoic (or pyromucic) acid, corresponding to benzyl alcohol and benzoic acid. As will be seen, furfural, like formaldehyde, will form condensation products with phenols, urea, ketones, aromatic amines, etc., and it is in this connection that it is of interest to us here.

In 1921 the Quaker Oats Co. made certain experiments on increasing the digestibility of oat feed by partial hydrolyses with acids and alkalies. When acids were employed it was noticed that under some conditions furfural was detectable in the product. Stimulated by this experience and by a paper of Monroe (*Ind. Eng. Chem.,* 1921, *13,* 133) on the preparation of furfural from corn-cobs, the company, in conjunction with the Miner Laboratories, became seriously interested in furfural as a possible outlet for the oat husks, produced in great bulk at the oat-rolling mills, which had hitherto been utilised only for fuel or cattle-feed (Miner, Trickey, and Brownlee, *Chem. and Met.,* 1922, *27,* 299). Thus it was that furfural, practically a century after its discovery, became an industrial raw material.

An Economical Source of Furfural

Considerable research was undertaken, and comparative studies showed that oat husks were not only a convenient, but also an economical, source of furfural. The husks are introduced into rotatory autoclaves and moistened with a small quantity of sulphuric acid. Steam at 150-155° C. and 60 lb./sq. in. is passed over the mix. Great saving in steam is effected by arranging the autoclaves in series, so that vapours from a partially exhausted charge pass over a freshly introduced charge. In the case of a single autoclave the furfural content of the vapours falls from 10 per cent. to 1 per cent. towards the end of the reaction. If this serial arrangement were not employed far more steam would be required to remove each unit of furfural than is actually the case. The furfural-laden vapours are led into a fractionating column which is heated by a portion of these vapours themselves, leading to greater efficiency of the process. A wet furfural is thus obtained, containing some 5 per cent. water. This crude furfural is substantially dehydrated by passage through an apparatus where it is heated rapidly to 160° C. and cooled just as quickly, the short heat treatment being insufficient to cause discoloration, but sufficient to dry the product. The extreme simplicity of this preparation, in conjunction with the readily available and relatively huge supplies of oat husks, renders furfural a material of great industrial promise.

In a review of the economic situation of furfural, Peters (*Ind. Eng. Chem.,* 1937, *15,* 269) states that the potential production from oat husks, yielding 11 per cent., is 35,362 tons per annum. Maize straw, with a yield of 6 per cent., is a potential source of 1,924,980 tons of furfural; wheat straw, giving the same yield, could provide 2,247,900 tons per annum; and a total of some 6,000,000 tons could be produced yearly from all the available waste materials containing cellulose. Estimates of the annual world consumption of furfural vary from 900 tons to 2500 tons. Other countries besides America are displaying interest in furfural as a raw material. German and French patents have been issued relating to the hydrogenation of furfural, and possible uses for the products of this; a plant operates in Sweden for the preparation of furfural from tanbark; the interest of the U.S.S.R., with its enormous agricultural regions, is shown in a concrete form by the increasing number of chemical and technical papers dealing with furfural which are published in that country.

Furfural in Oil Refining

Much lengthy investigation, both technical and chemical, is, however, necessary before a substance new to industry can be employed in bulk. Many aspects of furfural have been surveyed, but far more remain unexplored. Few even of the established facts have as yet been fully exploited. In the course or research it was found that furfural is a solvent for a very wide range of substances. From this observation was developed a new process for the refining of lubricating oil, which is enjoying increasing popularity (Eichwald, U.S.P. 1,550,523, 1925). The crude oil is agitated with furfural at an elevated temperature. On cooling, a lower layer, consisting of furfural and impurities, separates, and is removed. The upper layer is subjected to the further processes involved in the manufacture of lubricating oil. The method is very economical owing to the almost complete recovery of the selective solvent, furfural, which extracts the aromatic, olefinic, and sulphur-containing impurities, which produce " sludge."

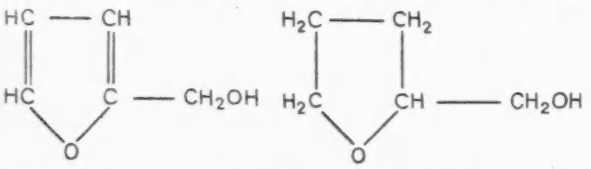
Two years after the issue of Eichwald's patent, the Hercules Powder Company started a new and important method for the refining of wood rosin (B.P. 253,002, 1926, and 275,862 1927; U.S.P. 1,715,084 and 1,715,085 1929 to Kaiser and Hancock). The crude dark rosin is dissolved in petroleum spirit and agitated with furfural at a temperature at which the two liquids are miscible. On cooling, two layers separate, the one a light-coloured solution of rosin in petrol and the other a solution of the coloured impurities in furfural. These refining industries are to-day the greatest outlets for furfural.

Formation of Polymers

As already mentioned, furfural is an active resin-forming chemical. It possesses pronounced tendencies towards polymerisation, which are enhanced by basic, and particularly by acid, catalysts, dark resinous materials resulting. It will be remembered that formaldehyde and acetaldehyde are themselves readily polymerised. One of the earliest synthetic resins was that obtained by Döbereiner by treating acetalde-

hyde with alkali. Here the aldehyde group is involved, but in the case of furfural the conjugated double bonds and the oxidic linkage probably allow of polymerisation in other directions. These resins from polymerised furfural appear to have been applied only to the impregnation of wood, where they are formed *in situ* by treating the wood with furfural, followed by a wash of dilute hydrochloric acid.

Furfural can be catalytically hydrogenated in two stages. The first step is the reduction of the aldehyde group to form furfuryl alcohol. Further hydrogenation saturates the conjugated double bonds, tetrahydrofurfuryl alcohol resulting.



FURFURYL ALCOHOL. TETRAHYDROFURFURYL ALCOHOL.

Furfuryl alcohol is even more sensitive to acids than furfural itself, and this fact is also utilised in the impregnation of wood. Investigations have been undertaken in the laboratories of the Quaker Oats Co. with a view to controlling this reaction, which is rather violent, by carrying it out in aqueous solution.

A paper by Dinelli and Roberti (*Ann. Chim. Appl.*, 1936, *26*, 321-324; 324-330) describes the preparation, by the polymerisation of furfuryl alcohol with iodine, of hard or soft resins, which are claimed to possess good mechanical and electrical properties and to be suitable for the manufacture of pressed pieces. The dark resins prepared by Mauthner (*Kunsts.*, 1913, *3*, 88) from condensing cellulose with phenols in the presence of mineral acids, and which were later obtained by Novotny and Romieux (B.P. 208,193, 1922), are apparently to be regarded as furfural resins, the furfural being derived in some manner from the breakdown of the cellulose. Soane (B.P. 2167, 1915) prepares a resin from glue, glycerine, a filler, and a pentose, which would also appear to be a furfural resin. Furfural forms resins by interaction with a number of materials. Acetone will condense in several ways, forming such compounds as furacrolein, furfural-acetone, and difurfural-acetone.

Applications of Furfural Resins

Furacrolein is a crystalline material with a cinnamon odour, which may possibly be of value for flavouring, and capable of polymerisation to produce resins (König, *Ber*, 1925, *58*, 2564). Cinnamic aldehyde, the analogous compound in the benzene series, does not exhibit this tendency. In fact, the furane compounds are far more prone to resinify than their aromatic analogues, as would be expected from a consideration of the structure of the furane ring. The furfural-acetones readily polymerise. Meunier (F. P. 472,384, 1913) prepared a yellow resin suitable for oil varnishes by refluxing acetone and furfural with 30 per cent. caustic soda solution. By varying the conditions of the reaction, darker varieties of resin may be obtained, from which black stoving enamels, moulded articles, etc., may be manufactured. In some cases furoic acid, the crystalline analogue of benzoic acid, has been suggested as a substitute for furfural (Plauson, D.R.P. 386,013, 1930). Aniline and other aromatic amines react with furfural to produce resinous materials (Mains and Phillips, *Chem. and Met.*, 1921, *24*, 661) soluble in various organic solvents—particularly furfural itself. Stenhouse (*Ann.*, 1840, *35*, 301) noted the production of hydrofuramide, the analogue of hydrobenzamide, from treating furfural with ammonia. This compound on heating passes into a resinous mass consisting of impure furfurin, the analogue of benzin (Miner, Trickey, and Brownlee, *Ind. Eng. Chem.*, 1923, *15*, 65).

U.S.P. 1,648,178, granted to S. M. Hull, describes the preparation of a plastic material by the hardening of proteins, such as glue and casein, by means of furfural or hydrofuramide under the action of heat and pressure, and claims that this is suitable for the manufacture of printing-rollers. The hard resilient masses resemble phenol-formaldehyde resin. This, however, could not be classed as a synthetic plastic.

Condensation with Phenols

Like formaldehyde, furfural can condense with urea, in the presence of a basic catalyst. Kappeler (B.P. 293,872) mentions dark resins, insoluble in the usual resin solvents and unaffected by alkalies and dilute acids, derived from this condensation. Naphthylamine, thiourea, and other amines form resinous condensation products with furfural. According to Novotny and Johnson (U.S.P. 1,827,824 and 1,951,526) the temperature of the reaction is very critical. These workers have prepared rubber-like masses from furfural and urea, which can be modified by the addition of chinawood-oil, lanolin, etc. The most important of furfural resins, however, are those produced by the condensation of furfural with phenols. Perioz (*Wagner's Jahrber.*, 1860, *6*, 489), and later Stenhouse and Claisen, recorded the resinification of furfural with phenol. Many years later the reaction was investigated in greater detail by Beckmann and Dehn (*Litz. kgl. preuss. Akad. Wiss.*, 1918, 1201) who obtained a dark mass of a hardness resembling " C " stage phenol-formaldehyde resin from phenol and furfural in the presence of an acid catalyst. If a large excess of phenol were present, a solid fusible material resulted. The rate of reaction has been found to depend on the pressure and the amount of mineral acid present, organic acids having scant activity. Various metallic salts, including ferric furoate, organic halogen derivatives, and metals in a fine state of subdivision, may be employed as catalysts. Furfural reacts much more slowly with phenols in the presence of a basic catalyst than does formaldehyde. Lengthy heating is required, except in the case of alpha-naphthol, and for the preparation of insoluble resins with an alkaline catalyst a 25 per cent. excess of furfural is recommended. (Miner, Trickey, and Brownlee, *Ind. Eng. Chem.*, 1923, *15*, 165).

The properties of furfural resins have been summarised by E. E. Novotny (*Modern Plastics*, 1936, *14*, 33), who has been responsible for much of the fundamental work on this subject. They possess a flat, elongated, elasticity curve at preliminary heating temperatures, during which time little or no polymerisation occurs, and an almost vertical curing curve at temperatures exceeding 160° C.; likewise a retention of dimensional accuracy on moulding and low thermoplasticity on heating. Little pigmentation is required for the production of dark colours. The furfural-phenol reaction being virtually water-free, a smaller quantity of phenol is required owing to the high molecular weight of the furfural. For the same reason there are fewer hydroxyl groups requiring inactivation in the resin. The reaction therefore goes to completion more rapidly than does the phenol-formaldehyde reaction. As a result, furfural resin is more suited for resistance elements. The resistance of the element shows less tendency to alter from further changes occurring in the resin after construction of the element (U.S.P., 2,068,113, 1937, to Schellenger and Haselwood).

Use as a Wetting Agent

If an excess of furfural be used in a resin bond, the bond is not weakened, since furfural itself resinifies. This property, together with its great wetting power and solvent power on resins has occasioned the widespread and increasing use of furfural as a wetting agent in the manufacture of resin-bonded abrasive wheels. It is stated by Peters (*Ind. Eng. Chem.*, 1936, *28*, 756) that " the grinding costs incident to the manufacture of a moderate priced automobile have been reduced 80 per cent. during the last ten years, and wheels in which furfural was used have been largely responsible for this saving." Furfural resin mouldings assume not only the shape, but the polish of the mould, and may be produced in natural brown or black, red, green, yellow, mahogany, walnut, and oak shades. Furfural-urea resins may be considerably lighter, and with these pastel shades may be obtained.

The physical properties of furfural-phenol resins are good,

and vary with the filler. The following data refer to "Durite" resin with a wood-flour filler :—

Tensile strength	500 lb./in.²
Impact strength	11.8 cm./kg.
Transverse strength ...	16,000 lb./in.² (when moulded at temperatures higher than 230° C.)
Specific gravity	1.35
Coefficient of expansion ...	0.00003/° C.
Distortion under heat ...	10 mils. at 130° C. (ASTM)
Dielectric constant (60 cycle)	4.5
Dielectric constant (radio frequency)	5.0
Power factor (radio frequency)	0.7-5.7 (depending on type of filler used)
Specific heat	0.30-0.40 cal./° C.

(For further data regarding "Durite" resins *see Chem. Met. Eng.*, Data Sheets, Supplement, September, 1929).

Furfural resins have excellent thermal stability, and moulding at 250° C. gives a product of great mechanical strength. A curing cycle of one-half to two minutes is common, and the resins are completely stable to water. A pure furfural resin will absorb no moisture, and the oil absorption is remarkably small. A commercial sample immersed for 100 hours absorbed only 0.18 per cent. of moisture. Here the filler exerts an influence, asbestos or mica fillers being least affected. The burning rates of these resins are extremely low, and no ageing effect is detectable. Ultra-violet light slightly darkens some of the lighter resins, but sunlight has no such effect.

According to Novotny, most of the furfural resins are sold as raw materials to the large moulders, who prepare from them special moulding compounds to suit their own particular needs, and in many cases the output of mouldings has been materially increased.

The protection of wood by the formation of furfural-phenol resins *in situ* has been described by Routala and Kuula (Teknillinen Aikakauslehte, 1932, *22*, 421), who impregnate by heating with furfural, phenol, and ammonia. The resin so formed blocks the cavities of the wood and so resists decay, the great penetration of furfural being important here. D.R.P. 536,677, issued to Bakelite, describes a similar process.

Furfural as Plasticiser

Furfural resins have not been exploited in the United Kingdom, and the attention of our plastics trade has been directed more towards the plasticising properties of furfural. Furfural is mentioned as a plasticiser in a number of patents, assigned to Bakelite and others, and in U.S.P. 1,716,665 (1929), issued to Redman and Turkington, this property is utilised to allow the incorporation of a greater quantity of filler. Brock (U.S.P. 1,609,506) treats soluble and fusible resins with 15 per cent. of furfural. On hardening, a material of greater plasticity results.

The use of furfural in the plastics industry is notably on the increase, although relatively small quantities are absorbed at the moment, and there is every reason to suppose that eventually furfural resins will be produced on a much larger scale, especially since their yield is good. In this connection the "bulking" action of furfural is significant. It has a molecular weight of 96 as opposed to 30 for formaldehyde. Consequently, as previously mentioned, a given quantity of furfural resin contains less of the more expensive constituent, the phenol. The prices of phenols are ascending and there is no indication that they have reached their peak. Any measure that reduces the phenol content and at the same time produces a good resin will be welcome. Furfural is, even in the quantities at present absorbed by the plastics industry, very little dearer than formaldehyde. Assuming the price of an approximately 37 per cent. solution of formaldehyde to be about 2½d. per lb., absolute formaldehyde will be 6¾d. In ton lots furfural is quoted in this country at about 7½d. Obviously, if it were used on a larger scale it would be much reduced in price, and possibly could be quoted at less than 5d. per lb. Manufacturers are often prejudiced against a new raw material, not because it is new or because they do not believe in its possibilities, but because they have not always the time in which to carry out the research necessary to enable that material to be adapted to the conditions prevailing in each particular works and to replace other materials involving well-tried processes. In the case of furfural, however, this conservative attitude is becoming less evident.

Utilisation of Copal Oils

New German Patent

THE fumes evolved in large quantities, during the preliminary "running" of copal resins to render them soluble in varnish oils, can be condensed to an oil for which various uses have been found. A recent development announced in D.R.P. 693,048 of Deutsche Hydrierwerke is their hydrogenation under very high pressure to new oils of value in many industries. Of chemical interest is the fact that hydrogenation converts the carboxyl groups present in crude copal oil into alcohol groups. A Congo copal (saponification value 70.4, acid value 69.5) used in one experiment gave 300 gm. crude copal oil, which was heated in a stirring autoclave with 30 gm. copper-manganese catalyst for an hour at 270°-300° C. under a hydrogen pressure of 270 atmospheres. Distillation gave a faintly green liquid in a yield of 90 per cent. which boiled over a range of 120°-220° C. at 10 mm. pressure and had an acetyl value of 38.3. This is recommended as a solvent for stoving lacquers. Operation on similar lines with the oil from a kauri copal gave a green hydrogenated oil suitable for incorporation in dust-binding dressings, insecticides, intaglio inks, soaps, and polishes.

Benzotriazole as Reagent

Quantitative Determination of Copper

A NEW organic precipitant for copper, benzo-1, 2, 3-triazole, is described by J. A. Curtis, of the Battelle Memorial Institute, in *Ind. Eng. Chem.* (Anal. Ed.), 1941, *31*, 5, p. 349. Copper is precipitated in a tartaric-acetic acid solution at a *p*H of 7.0 to 8.5. In the absence of silver, nickel, cadmium, zinc, cobalt, and ferrous iron the precipitate can be weighed directly. In their presence (unless in large amounts) the reagent can be used to effect a preliminary separation, and the copper subsequently determined by a standard method—for example, electrolytically or by the potassium iodide-thiosulphate method.

Benzotriazole is an excellent precipitant for copper in iron and steel preparatory to analysis by the iodide-thiosulphate method. It possesses the advantage over hydrogen sulphide precipitation that arsenic, antimony, and molybdenum are not precipitated. Its principal technical disadvantage, as compared with the sulphide method, lies in the narrow limits of the conditions of *p*H suitable for precipitation. Another inherent objection is the cost of the reagent, 10 gm. costing about 15s. 3d., while about 1 gm. is used per determination.

Details of the proper conditions of acidity, temperature, *p*H, etc., for precipitation are included in the paper, as well as an exposition of the procedure for determining copper in iron and steel.

POTASSIUM OXALATE MANUFACTURE

A new process for manufacture of potassium oxalate, based on high-temperature treatment of potassium formate with hydrogen, forms the subject of D.R.P. 693,328 (R. Koepp & Co. Chem. Fabrik). A suitable raw material is commercial potassium formate containing about 3 per cent. potassium hydroxide. On passing a stream of hydrogen through a molten mass of the salt at 300°-350° C., gradual solidification occurs and the product contains about 93 per cent. potassium oxalate after the reaction has proceeded for 60 to 90 minutes. It is essential that the hydrogen should be uncontaminated with oxygen or an oxygen-containing compound.

Personal Notes

DR. WALER S. LANDIS, vice-president of the American Cyanamid Co., has been elected president of the Chemist's Club, New York.

DR. HAROLD AUGUSTIN TEMPANY, C.M.G., C.B.E., D.Sc., F.I.C., F.C.S., has been appointed Agricultural Adviser to the Colonial Minister, in succession to Sir Frank Stockdale.

PROFESSOR RALPH H. MULLER, who occupies the chair of chemistry at New York University, was recently elected chairman of the New York Section of the American Chemical Society in succession to Dr. Robert Calvert.

PROFESSOR J. C. PHILIP, O.B.E., F.R.S., retiring president of the Society of Chemical Industry, was awarded the honorary degree of LL.D. on July 9, by the University of Aberdeen, of which he is an alumnus.

FLYING-OFFICER PAUL MAYHEW, R.A.F., whose escape from internment in Eire was recently announced, is the son of Sir Basil Mayhew, director of Reckitt & Colman, Ltd. F/O Mayhew was married on July 10 to Miss Monica Stancliffe, of Grantham.

SIR WILLIAM BIRD has intimated his intention of retiring in September from the chairmanship of the Staveley Coal and Iron Co., Ltd., and he will be succeeded by the present managing director, MR. D. N. TURNER. MR. H. H. BERRESFORD, deputy managing director, will succeed Mr. Turner as managing director.

MR. GEORGE SAMUEL SEWELL, maintenance engineer, Shell-Mex and B.P., Ltd., who was among the first to be awarded the George Medal, as recorded in THE CHEMICAL AGE on October 5, 1940, is now the first to receive a bar to the medal. He successfully extinguished a fire, caused by incendiary bombs, which was raging in an oil depôt, although enemy aircraft were overhead and bombs continued to fall.

LIEUT. GEOFFREY GLEDHILL TURNER, R.N.V.R., who has been awarded the George Cross for great gallantry and undaunted devotion to duty, is a director of Alec Parsons, Ltd., manufacturing chemists, of Manchester. Lieut. Turner joined the Army shortly after the outbreak of war, but was discharged on medical grounds; he succeeded in joining the R.N.V.R.

MR. E. L. PAYTON, J.P., who has been appointed chairman of the Austin Motor Co., Ltd., in succession to the late Lord Austin, is a vice-president of the National Union of Manufacturers, Midland Area, and represents Birmingham on the Grand Council of the Federation of British Industries. Mr. Payton was elected to the Board in April, 1922, and became deputy chairman in November, 1928.

SIR CHRISTOPHER CLAYTON, C.B.E., Ph.D., F.I.C., famous for his work in the field of industrial chemistry, is about to withdraw from active public life. Since the brief announcement in our last issue of his retirement from the chairmanship of the Liverpool Gas Co., news has come that he is proposing to leave for his home in Scotland for an indefinite period. He has had a distinguished chemical career, beginning in 1896 with research work in the laboratories of the United Alkali Co., and ending as a director of the I.C.I. He was educated at Harrow and at Liverpool University, and took his Ph.D. degree at Heidelberg University. During the last war he served on the advisory committee of the Trench Warfare Department, in recognition of which he was awarded the C.B.E. He has also been a member of the Board of Trade Advisory Council, where he represented the chemical industries. He entered Parliament in 1922 as Conservative member for the Widnes Division of Lancashire and again in 1931 for the Wirral Division of Cheshire. He was knighted in 1933.

OBITUARY

MR. WILLIAM MUIR MACKEAN, of William MacKean, Ltd., starch manufacturers, Paisley, who died on July 5 at Johnstone, Renfrewshire, was a former chairman of the Royal Victoria Eye Infirmary, Paisley.

MR. H. LLOYD HIND, B.Sc., F.I.C., whose death took place recently, was Hon. Foreign Secretary of the Institute of Brewing.

DR. ARTHUR COMINGS LANGMUIR, who died on May 14, aged 69, at Hastings-on-Hudson, N.Y., was especially well known as a chemist in the glycerine and lac industries. He represented the American Chemical Society as chairman of the Commission that attended the International Conferences on Glycerine Analysis (London, 1910) and Shellac Analysis (Calcutta, 1925 and 1930). He was a member of the Society of Chemical Industry and ex-vice-president of the American Society of Chemical Engineers, and was a brother of Dr. Irving Langmuir, the Nobel prizewinner.

SIR WILLIAM HENRY WILLCOX, K.C.I.E., C.B., C.M.G., M.D., B.Sc., F.R.C.P., F.I.C., the distinguished physician, who died suddenly in Welbeck Street, London, on July 8, was a notable exception to the alleged rule that members of the medical profession are ignorant of chemistry. At London University he was gold medallist in organic chemistry and he lectured on the chemical side of pathology at St. Mary's Hospital in 1900-30. He examined in pharmacology at Cambridge University in 1928-34, and had published many original papers on chemical pathology and forensic medicine. He was elected Fellow of the Institute of Chemistry in 1901.

Chemical Matters in Parliament

Extinguishing Incendiary Bombs

IN the House of Commons last week, Mr. Evelyn Walkden asked the Home Secretary what steps had been taken to put an end to the practice of the canvassing of householders to buy proprietary articles and chemical mixtures purporting to extinguish incendiary bombs which have not been approved by the Home Department; and whether he would forbid such canvassing and confiscate the advertising literature.

Miss Wilkinson replied that the Home Secretary was examining the possibility of obtaining powers to prohibit the sale or advertisement of harmful preparations purporting to extinguish incendiary bombs.

Scrap Metal from Bombed Sites

Mr. Thorne asked the Minister of Supply whether he could give any information in connection with the need of collecting the girders and iron from bombed buildings in and around London; whether this scrap iron was now wanted for the making of steel; and whether he had been in consultation with the steel control contractors about the matter?

Mr. Harold Macmillan, in answer, stated that there was a continued need for all the iron and steel scrap available to ensure present and future production of steel. The Iron and Steel Control were working with the L.C.C. and the special committee set up by the London Defence Authority for the clearance of the bombed sites to secure the removal and utilisation of the steel as rapidly as practicable, and the fullest use was being made of the available facilities of demolition contractors and scrap merchants. Scrap iron was flowing now at the rate of about 3500 tons per week from London alone, about three times the rate which obtained about a month ago.

Scientific Advisory Committee

In reply to Captain Plugge, who asked whether the Lord President of the Council was aware that both the Scientific Advisory Committee and the Engineering Advisory Committee were not in every case able to obtain immediately essential technical advice, or to select persons most able to give such advice, particularly with regard to matters affecting chemistry and physics; and whether he could arrange for the closer association with these bodies of representatives of chemistry and physics with experience of industry, or to provide them with liaison officers competent to supply the necessary contacts with the minimum of delay, Sir John Anderson stated that neither of the committees mentioned had met with any difficulty in obtaining the technical advice it required.

Provision of Fine Chemicals

Chemical Society's Aid to the National Effort

THE Advisory Research Council of the Chemical Society has inaugurated a scheme to facilitate the supply of fine chemicals needed for work of national importance, but which are not available commercially. The sub-committee organising this work particularly desires to draw the attention of all users of fine chemicals to the existence of this scheme, in order that the greatest possible use may be made of the generous offers of help which have been received from numerous chemists in universities, technical colleges and schools, who have suitable laboratory facilities at their disposal. The scheme, which works in close collaboration with the Association of British Chemical Manufacturers, is an attempt to use to the best possible advantage both the laboratory facilities and the skilled man-power in teaching institutions and other laboratories which may not at present be fully harnessed to the war effort.

Before a chemical can be accepted for preparation under this scheme the committee must be satisfied that the chemical is unobtainable from any British manufacturing firm and that it is required for urgent work of national importance within the British Empire. The scheme provides for the manufacture of approved items at basic charges which represent only the cost of raw material and such overheads as gas, electricity, etc. There is no charge for the chemist's services. Inquiries from both individuals and firms for chemicals which might be produced under the scheme should be made to the Secretary, Mr. S. E. Carr, the Chemical Society, Burlington House, Piccadilly, London, W.1.

Coffee Preserving

Freezing Method to Avoid Staleness

HAVING noted that staleness and rancidity in coffee are caused by oxidation of the aromatic oils and esters found in the freshly-roasted bean, John C. Donelley has taken out a patent (U.S.P. 2,235,315) for preserving coffee by freezing. At normal pressures and temperatures roasted coffee generates and gives off large quantities of carbon dioxide gas. The presence of the gas on and about the coffee beans or particles acts as a partial seal against oxidation, the heavier carbon dioxide clinging to the coffee and excluding oxygen. Research shows that rancidity and staleness of roasted coffee appear to be a function of the emanation of carbon dioxide. The patent subjects the coffee beans, immediately after roasting, to a very low temperature, ranging from at most $-12°$ C. to $-75°$ C. At these temperatures, the gases liberated during the roasting are re-absorbed.

The low temperature is maintained as the beans are ground and pressed into cakes for storage. In addition to the cold, the small area of the coffee exposed by reason of its cake form discourages the emanation of the gas. Thus, oxidation and consequent rancidity and staleness are substantially prevented and the coffee is brought to the consumer in practically its original state of freshness. When a cake of the compressed and chilled coffee is dropped into boiling water, the original aroma and volatile esters are immediately liberated and pass directly into the water which thus receives and absorbs the highest possible amount of flavour, while the brew will be of higher concentration or specific gravity per unit of coffee used.

American Tungsten Production

Large Increase in 1940

ACCORDING to official sources the production of tungsten ore and concentrates in the United States in 1940 increased 42 per cent. over 1939. Shipments from domestic mines, which were 24 per cent. more than in 1939, were the largest since 1917. In 1940, 5319 short tons of concentrated ore (reduced to an equivalent of 60 per cent. WO_3) were shipped from domestic mines, compared with 4287 tons in 1939. The reported average value per unit f.o.b. mines of the tungsten concentrates shipped increased to $20.61 from $17.11. California produced the largest amount of tungsten in 1940. The production of tungsten concentrates (60 per cent. WO_3) was 5120 short tons compared with 3603 tons in 1939, while the general imports of ore and concentrates (tungsten content) amounted to 9,666,228 lb., an increase of 211 per cent.

In addition to the ore and concentrates imported for consumption, 1,348,495 lb. of tungsten in concentrates were imported for smelting, refining and export in 1940 compared with 589,828 lb. in 1939. The imports of tungsten metal and tungsten carbide were 36,652 lb., compared with 39,498 lb.

A CHEMIST'S BOOKSHELF

RECONSTRUCTION OF BOMBED BUILDINGS. By B. S. Townroe, D.L., J.P., Hon. A.R.I.B.A., London: The Individualist Bookshop. Pp. 30. Sixpence.

Prophets of a post-war paradise tend to be too numerous just now, and Mr. Townroe's highly practical pamphlet should be universally read as a corrective to their vapourings. This fourth booklet in the series entitled "Post-War Questions" appears most appositely, at a time when the nebulous word "planning" emerges too often and too glibly from the lips of officials and others

The problem of the physical reconstruction of the war-battered towns of Europe is a *practical* problem if ever there was one, and Mr. Townroe's text is, in effect, "Save us from the cranks!" Mr. Townroe is emphatically not a crank; the logical arrangement of the present pamphlet demonstrates that at once. The text is divided informally into four sections, which may be described as: (I) what has been done about reconstruction in the past; (II) what should be done in the future; (III) what can be done; and (IV) what, in his opinion, might be done.

Space precludes more than a cursory reference to Part I, a brief but illuminating note on the difficulties following the Great Fire of London in 1666 and the devastation of Northern France in 1914-18, with their lessons for us today. Part II deals with "proper planning," and what it really involves. The subject bristles with unanswered queries. Who is to plan? Can we find planners "adamant against the pressure of vested interests and proof against bribes?" Will the British people put up with a planning dictatorship after the war? Is building to be standardised to the detriment of individual initiative and genius? For the moment the author wisely leaves us there, our minds full of a healthy doubt as to the wisdom of a premature decision. Part III descends to brass tacks. However good the paper schemes, nothing can be done without the builders. Disregard of the building trade's problems after the last war led to chaos, stagnation, and price-inflation, which must not recur. There is, however, a body known as the Building Industries' National Council, specially constituted to deal with these problems, and representative of all building interests, which the "planning" authorities will do well to consult. Mr. Townroe notes a disquieting tendency on the part of Government departments to ignore such bodies.

In Part IV, Mr. Townroe absolves himself of the charge of being a purely destructive critic and advocates a sound plan on broad lines. Business men, to begin with, must be induced to take an interest in reconstruction as a whole, and there is one Government enactment, at any rate, which has made this a reasonable demand. Ways and means of paying for rebuilding have been provided for by the War Damage Insurance Act, which is administered by a Commission with no axes to grind. Based upon this, Mr. Townroe has evolved a scheme which, while avoiding over-bureaucratic control, enables the individual, whether a private citizen or a public authority, to accept Government aid in reconstruction without wholly sacrificing personal inclination. If only we can bear the author's sound advice in mind, and steer a course between red tape and sentimentality, reconstructed Britain may *in due time* be, if not a paradise, at any rate an agreeable place to live and work in.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Complete Specifications Accepted

HYDROLYSIS OF CELLULOSIC MATERIALS.—P. F. Reemtsma and C. Warth (trading as Chemische Fabrik Löwenberg Dr. Warth and Co.). March 22, 1938. 536,759.

PREPARATION OF ESTERS OF CHLORACRYLIC ACID.—F. J. Cleveland (Pittsburgh Plate Glass Co.). Aug. 22, 1939. 536,806.

METHOD OF PRODUCING FUSIBLE ACRYLATE POLYMERS, and infusible polymers therefrom.—Pittsburgh Plate Glass Co. Aug. 23, 1938. 536,807.

METHODS OF INCREASING THE RESISTANCE OF METAL ARTICLES to the effect of embrittling reagents or corroding reagents or both, and metal articles produced thereby.—Standard Steel Spring Co. Oct. 31, 1938. 536,812.

MANUFACTURE OF HYDROCARBONS BOILING WITHIN THE GASOLENE RANGE.—Standard Oil Development Co. Dec. 7, 1938. 536,813.

STRUCTURES FORMED OF FABRIC and polymerised isobutylene butadiene.—Standard Oil Development Co. Dec. 30, 1938. 536,876.

CALCIUM HYPOCHLORITE PRODUCT and process for making same. H. G. C. Fairweather (Mathieson Alkali Works, Inc.). Nov. 20, 1939. (Addition to 536,496.) 536,818.

SEPARATION OF OLEFINES FROM GASEOUS MIXTURES, and the storage of such olefines.—Standard Oil Development Co. Dec. 30, 1938. 536,819.

HYDROGENATION OF CARBON MONOXIDE to produce hydrocarbons having more than one carbon atom in the molecule.—H. E. Potts (N. V. Internationale Koolwaterstoffen Synthese Mij. (International Hydrocarbon Synthesis Co.)). Nov. 22, 1939. 536,767.

RECOVERY OF MAGNESIUM from finely divided magnesium or magnesium alloy scrap.—Sir J. H. Rutherford, Lancashire Metal Subliming Corporation, Ltd., Magnesium Electron, Ltd., H. R. Leech, and S. E. Matthews. Nov. 24, 1939. (Cognate application, 3617/40.). 536,821

PROCESS FOR THE PRODUCTION OF WATER-SOLUBLE HIGH MOLECULAR αSUBSTITUTED ARALKYL AMINES and derivatives thereof, and the resulting products.—J. R. Geigy, A.-G. Nov. 25, 1938. (Cognate application, 30705/39.) 536,881.

TREATING A PRODUCT SYNTHETICALLY FORMED FROM PROTEIN MATERIAL to improve or modify its dyeing affinities, resistance to water and chemicals, and other properties.—Atlantic Research Associates, Inc. Nov. 25, 1938. (Cognate application, 30712/39.) 536,841.

MANUFACTURE OF CELLULOSE DERIVATIVES containing sulphur and nitrogen.—Soc. of Chemical Industry in Basle. Nov. 9, 1938. (Cognate application, 30738/39.) 536,768.

MANUFACTURE OF HYDROAROMATIC COMPOUNDS.—Soc. of Chemical Industry in Basle. Nov. 25, 1938. (Cognate application 30740/39.) 536,769.

PROCESS FOR THE PRODUCTION OF LUBRICANTS.—N. V. de Bataafsche Petroleum Mij. Dec. 5, 1938. 536,827.

MANUFACTURE OF RUBBER CHLORIDE.—Raolin Corporation. Dec. 12, 1938. 536,828.

APPARATUS FOR TRANSFORMING A LIQUID into an aerosol by ultra-atomisation of the liquid.—V. A. Trier and Andre (Components), Ltd. Nov. 28, 1939. (Cognate applications, 30998/39, 32511/39, and 32512/39.) 536,833.

MANUFACTURE OF 1-AMINO-4-(4′-OXY)-PHENYLAMINOANTHRAQUINONES.—Soc. of Chemical Industry in Basle. Nov. 29, 1938. (Cognate application, 31067/39.) 536,885.

PROCESS FOR THE CRACKING OF OILS.—A. C. Jessup. Dec. 5, 1938. 536,891.

PROCESSES FOR PRODUCING COPPER BASE BORON ALLOYS, and oxygen-free copper base boron alloys of high electrical conductivity.—A. H. Stevens (American Brass Co.). Dec. 1, 1939. 536,893.

MANUFACTURE OF HARD OR HIGHLY VISCOUS INSULATING MATERIALS.—Callender's Cable and Construction Co., Ltd., S. Beckinsale and H. C. Page. Dec. 16, 1939. 536,838.

PRODUCTION OF HYDROCARBONS by conversion of carbon monoxide with hydrogen.—H. E. Potts (N. V. Internationale Koolwaterstoffen Synthese Mij. (International Hydrocarbon Synthesis Co.)). Dec. 21, 1939. 536,843.

PROCESS FOR THE PRODUCTION of halogen-substituted amino-aryl sulphonic acid derivatives, and the resulting products.—J. R. Geigy A.-G. Dec. 24, 1938. (Cognate application, 32736/39.) 536,901.

PROCESS FOR THE CATALYTIC CONVERSION of carbon monoxide with hydrogen into hydrocarbons.—H. E. Potts (N. V. Internationale Koolwaterstoffen Synthese Mij (International Hydrocarbon Synthesis Co.)). Jan. 24, 1940. 536,912.

REACTIVATION OF HYDROGENATING CATALYSTS.—Houdry Process Corporation. Feb. 24, 1939. 536,913.

SEPARATION OF MINERALS BY FLOTATION.—General Electric Co., Ltd., W. C. Hellyer and P. Rabone. Nov. 14, 1940. 536,868.

PARASITICIDES AND THE MANUFACTURE THEREOF.—F. W. Berk and Co., Ltd. (Endowment Foundation). Feb. 17, 1940. 536,923.

REFRACTORIES AND REFRACTORY MOULDS for casting metallic articles.—Titanium Alloy Manufacturing Co. (March 31, 1939. 536,857.

PROCESSES FOR TREATING THE SURFACES OF ALUMINIUM and aluminium alloys.—R. McGlasson and W. A. Bird. Aug. 17, 1940. 536,938.

Chemical and Allied Stocks and Shares

SENTIMENT in the stock and share markets has been encouraged by favourable views as to the latest war development, and although improvement in the volume of business was not sustained security values were better on balance. Demand centred mainly on British Funds and other investment stocks, accompanied by renewed talk in the City of the possibility that a new Government Loan issue may be intended. It is also being suggested that plans for guarding against inflation may be brought forward before long, and that they will be designed to prevent large increases in wages and the cost of living. In this connection it is felt in some quarters that there may be definite proposals for the limitation of industrial dividend payments during the period of the war. It is pointed out, however, that in any case, owing to the weight of taxation, higher dividend payments cannot be expected. On the contrary there would be general satisfaction among shareholders in companies engaged on work vital to the war effort, if it were possible to keep dividends around their current rate; in fact in many instances yields at the prices now ruling are quite substantial.

Where changed, shares of companies identified with chemical and kindred industries have made higher prices in accordance with the surrounding tendency on the Stock Exchange. Imperial Chemical are 32s. 9d. at the time of writing, which compares with 31s. 9d. a week ago; at one time the 7 per cent. preference units went back to 32s. 9d., but later rallied to 33s. 3d. The prevailing view is that the I.C.I. dividend is likely to be maintained around 8 per cent., and it is pointed out that on this basis the yield still compares favourably with that obtainable on numerous other leading industrial shares. Lever and Unilever attracted more attention this week, and have further improved from 23s. 9d. to 25s. 1½d., while a better price was also made by Lever N.V. Elsewhere B. Laporte were around 60s., and Fison Packard 32s., but the shares remain firmly held and quotations were apparently not adequately tested by business this week. Nairn and Greenwich held their recent rise to 55s.; Barry and Staines were more active around 28s. On further consideration of the past year's result British Plaster Board 5s. shares rallied from 14s. 9d to 16s., while in other directions expectations that the interim payment is likely to be maintained drew more attention to Associated Cement, which were higher at 55s. On the other hand, now the dividend is known, there was rather less activity in Distillers ordinary units which moved back a few pence to 65s. An improvement from 43s. to 43s. 9d. was shown in British Aluminium, while Borax Consolidated again had a firm appearance at 28s. 6d. Further small gains were recorded in the iron and steel section; Guest Keen, which yield over 8½ per cent. gross, were slightly higher, allowing for the deduction of the dividend from the price. United Steel were 23s. 9d. and Stewarts and Lloyds 44s. 7½d. Among other securities Morgan Crucible preference issues remained firmly held (the 5 per cent. second preference transferred at 20s. 1½d.) on the good cover for dividend requirements, despite the very large sum absorbed in taxation. Dividend on the ordinary capital, which is privately held, is 10 per cent. Johnson Matthey 4 per cent. debentures, which do not often change hands, have shown business this week at 98.

Boots Drug were higher at 35s. 6d., while Imperial Smelting and General Refractories at 9s. 9d. and 8s. 6d. respectively had a firmer appearance. On further consideration of the past year's result Allied Ironfounders improved to 17s. 6d. Following publication of the annual report, Sanitas Trust 10s. ordinary shares whose dividend is again 12½ per cent. were quoted at 11s. 10½d. British Drug Houses were 23s. 9d. and Monsanto Chemicals 5½ per cent. preference 22s. 6d. Among oil shares the general tendency was better, although Trinidad Leasehold remained under the influence of the reduced interim dividend.

JAPANESE EXPORTS OF CHEMICALS, drugs, medicines, and explosives from January to September, 1940, rose to 86,820,270 yen from 71,960,445 yen in the same period of 1939.

General News

From July 14 the address of F. W. Berk and Co., Ltd., will be Commonwealth House, 1-19 New Oxford Street, London, W.C.1 (Tel.: CHAncery 6041).

The secretary of the Institute of Brewing announces that his office is now at the Goring Hotel, Grosvenor Gardens, London, S.W.1 (Tel.: VICtoria 821).

The Chemical Society's Library will be entirely closed for cleaning and stocktaking from August 4 to August 9 inclusive. The usual recall of books will, however, not take place.

Starting on July 8, the wholesale price of pool paraffin and of pool vaporising oil was increased by ¼d. a gallon, and the retail price of pool white spirit decreased by ½d. a gallon, by order of the Petroleum Board.

The latest list of civilian awards for bravery during air raids contains the names of no less than twelve employees of The Gas Light and Coke Company, who between them have received three George Medals and nine British Empire Medals.

A handy reprint of the section "Resins, Drying Oils, Varnishes and Paints, 1940," has been prepared by the Oil and Colour Chemists' Association from the Reports on the Progress of Applied Chemistry, Vol. xxv., 1940, published by the Society of Chemical Industry and reviewed in our issue of June 21.

The staff and employees of Kelvin, Bottomley and Baird, Ltd., scientific instrument and apparatus makers, Glasgow, have contributed £146 to charitable institutions for the year ended in May, in addition to £239 handed to the British Red Cross Society during the year ended in June.

Latest reports up to June 25 of the Widnes War Weapons Fund include the following generous contributions: £63 from Albright and Wilson; £148, High Speed Steel Alloys; £230, I.C.I. Pilkington-Sullivan Works; £115, from the staff and foremen of the same works; £350, Gaskell Marsh Works; £103 from the staff of those works; £175, Orr's Zinc White; £84, Peter Spence and Sons; £37, J. W. Towers and Co.; and £424 from Turners Asbestos Cement Co.

The Board of Education and the Ministry of Labour and National Service have published a beginner's guide to workshop calculations. It is a pocket size booklet containing 40 pages of graduated exercises and answers, diagrams and worked examples. The elementary stages lead on to more involved calculations which are amply explained. The handbook has been designed to help those making their first appearance in the engineering industry, and is extremely simple; it can be bought at the Stationery Office, price 3d., post free.

Foreign News

The total chemical imports into Canada during March were valued at $4,776,000 compared with $3,803,000 in March last year.

The United States Government is reported to be negotiating with Canadian, Mexican and Peruvian producers for additional supplies of lead.

Enlarged plant capacity for the production of muriate of potash (KCl) is planned by the Potash Company of America, Carlsbad, New Mexico. Work will start immediately on a new unit to be in operation about November.

The manufacture of power alcohol from wine by the Germans is reported to be causing a serious dearth of wine in occupied France. All stocks of over 100 litres of wine in Burgundy must be reported, and huge quantities are being bought or requisitioned by the Nazis.

E. I. du Pont de Nemours and Co. have announced that the site for their second Neoprene plant will be at Louisville, Kentucky. The new plant, having a capacity of a 10,000 long tons a year, which exceeds the present combined total production of all synthetic rubbers, is expected to be in operation in about six months.

The chrome mines of New Caledonia are finding in the United States an important outlet for their ores. The position is reflected by the annual report of Chagrin Chrome Mines, Ltd., whose annual profit rose from £A785 in 1939 to £A7500 in 1940. A similar profit for the year ended June 30 is forecast, with a substantial improvement next year.

From Week to Week

As a result of the efforts of the Council and the director of the Indian Institute of Science, Bangalore, an increase in the funds of the Institute from the current official year of about Rs.40,000 has been secured in order to supply technical information to industrialists.

Cresylic acid imports into Peru in the first ten months of 1940 amounted to 9200 kg., which must be compared with 30,434 kg. for the whole of 1939. Germany, the United Kingdom, and the United States have long been the principal suppliers, and it would appear that the cutting-off of German imports has not been made up.

The United States Government, in co-operation with the British and Dutch Governments and the International Rubber Regulation Committee, has suspended private imports of rubber from the Far East and is reducing civilian consumption in the next six months by one-fifth of the normal. The Rubber Reserve Company, a Government corporation, becomes the sole buyer of crude rubber imported from the Far East.

Commodities subject to export licence from the U.S.A. now include the following: columbium (niobium), tantalum, cryolite, fluorspar, chemical wood pulp (as from June 3); bismuth, zirconium, natural gums and resins, as from July 2). General licences have been issued for the export to Great Britain of vegetable fibres, calcium cyanide, sodium cyanide, casein, and lead pigments, but have been revoked in the case of atropine and belladonna.

A new plant for the production of Thiokol, with a capacity of more than 150,000 lb. per month, has been opened at Midland, Michigan, by the Thiokol Corporation and the Dow Chemical Co. Production capacity of the two units now operating exceeds 330,000 lb. per month. Officials of the Thiokol Corporation, indicate that they have begun to lay plans for the construction of still another unit which would increase by half the present total production capacity.

Optical glass has been produced without sand by the Eastman Kodak Co. This was revealed at the annual meeting of stockholders in a report which reported that instead of sand the new glass uses compounds of three rare metals—tantalum, tungsten, and lanthanum. The glass is said to have a much higher refractive index than previous optical glass; research on sandless glass began in the Kodak laboratories eight years ago at the suggestion of Dr. G. W. Morey, of the United States Geophysical Laboratory.

A plant for the manufacture of alumina from domestic supplies of andalusite is planned by A/B Svenska Aluminiumkompaniet. It will be erected in N. Sweden, where there is a good supply of cheap water power, either near Sundsvall or at Gävle. Andalusite is inferior to bauxite as a raw material, in that large quantities of silica must be removed at high cost. In peace time the plant will be able to deal with 6000 tons of bauxite annually, which compares with a war-time figure of 4000 tons of andalusite.

British West Indies Chemicals, Ltd., Bog Walk, Jamaica, about 20 miles from Kingston, was formed in 1940, to manufacture yeast, pure alcohol, vinegar, acetic acid, acetone, and other by-products of molasses. The authorised capital is £50,000, of which 50 per cent. was guaranteed by the Sugar Manufacturers' Association of Jamaica. The plant was scheduled to come into operation by the end of June, 1941, and a small order for sulphuric acid, formaldehyde, ammonium sulphate, and ammonium bichromate for its use has been sent to the United States.

Forthcoming Events

The Electrodepositors' Technical Society are holding a meeting at Northampton Polytechnic, St. John Street, E.C.1, on July 14, at 7.15 p.m., when a discussion will take place on "Plating Problems in Relation to the War Effort." The president, Dr. H. J. T. Ellingham, will take the chair.

The Bristol Section of the Society of Chemical Industry is holding a meeting on July 17 at 5 p.m., in the University Chemical Department, Woodland Road, Bristol, when Dr. A. E. Dunstan will speak on "Oil in Peace and War."

Weekly Prices of British Chemical Products

IN most sections of the general chemical market business is steady with no alteration in price conditions, and new bookings for home requirements appear to be well maintained with contract deliveries up to schedule. There is an active market for the majority of the soda products, hyposulphite of soda being in strong demand. Bichromate of soda is firm. There is no change of any importance to record in the potash section, the home-produced permanganate of potash being still in good call at recent levels. Formaldehyde remains firm. Trade in coal tar products is good, with solvent and heavy naphthas at the recently quoted higher levels, and creosote oil is steady. Cresylic acid is much in demand with prices firm.

MANCHESTER.—Business in the leading heavy chemical products on the Manchester market during the past week has been maintained on fairly satisfactory lines. From the principal using trades the demand for contract deliveries has kept up at recent levels, and a fair volume of both home and export inquiry has been reported. So far as prices are concerned, there has been little change from the generally firm conditions ruling for some time. In the by-products market supplies of the light distillates and also of cresylic and carbolic acids, as well as of crude and refined tars and creosote oil, are finding ready outlets.

GLASGOW.—Business in general remains fairly steady. Prices have more or less advanced considerably as from July 1.

Price Changes

Rises: Antimony sulphide, arsenic sulphide, cadmium sulphide, carbolic acid, carbon black, cresylic acid, india rubber substitutes, lactic acid, naphtha, pyridine.

Falls: Ammonium phosphate fertilisers, concentrated complete fertilisers.

General Chemicals

Acetic Acid.—Maximum prices per ton: 80% technical, 1 ton £39 10s.; 10 cwt./1 ton, £40 10s., 4/10 cwt., £41 10s.; 80% pure, 1 ton, £41 10s.; 10 cwt./1 ton, £42 10s.; 4/10 cwt., £43 10s.; commercial glacial, 1 ton, £49; 10 cwt./1 ton, £50; 4/10 cwt., £51; delivered buyers' premises in returnable barrels, £4 10s. per ton extra if packed and delivered in glass.

Acetone.—Maximum prices per ton, 50 tons and over, £65; 10/50 tons, £65 10s.; 5/10 tons, £66; 1/5 tons, £66 10s.; single drums, £67 10s.; delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each. For delivery in non-returnable containers of 40/50 gallons, the maximum prices are £3 per ton higher. Deliveries of less than 10 gallons free from price control.

Alum.—Loose lump, £9 10s. per ton, d/d, nominal.

Aluminium Sulphate.—£8 to £8 10s. per ton d/d.

Ammonia Anhydrous.—1s. 7d. to 2s. 2d. per lb.

Ammonium Carbonate.—£39 to £40 per ton d/d in 5 cwt. casks.

Ammonium Chloride.—Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £19 10s. per ton. MANCHESTER: Grey galvanising, £22 10s. per ton. See also Salammoniac.

Antimony Oxide.—£68 per ton.

Arsenic.—99/100%, about £31 10s. per ton, ex store.

Barium Chloride.—98/100%, prime white crystals, £11 10s. to £13 per ton, bag packing, ex works; imported material would be dearer.

Bleaching Powder.—Spot, 35/37%, £10 7s. 6d. per ton in casks, special terms for contract.

Borax, Commercial.—Granulated, £26; crystals, £27; powdered, £27 10s.; extra fine powder, £28 10s.; B.P. crystals, £35; powdered, £35 10s.; extra fine, £36 10s. per ton for ton lots, in free 1-cwt. bags, carriage paid in Great Britain. Borax Glass, lump, £73; powder, £74 per ton in tin-lined cases for home trade only, packages free, carriage paid.

Boric Acid.—Commercial, granulated, £42 10s.; crystals, £43 10s.; powdered, £44 10s.; extra fine powder, £46 10s.; large flakes, £55; B.P. crystals, £51 10s.; powdered, £52 10s.; extra fine powdered, £54 10s. per ton for ton lots in free 1-cwt. bags, carriage paid in Great Britain.

Calcium Bisulphite.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid, £5 15s. per ton ex store.

Charcoal Lump.—£10 10s. to £14 per ton, ex wharf. Granulated, supplies scarce.

Chlorine, Liquid.—£21 7s. 6d. per ton, d/d in 16/17 cwt. drums (3-drum lots); 5½d. per lb. d/d station in single 70-lb. cylinders.

Chrometan.—Crystals, 5½d. per lb.; liquor, £23 per ton d/d station in drums.

Chromic Acid.—1s. 2d. per lb., less 2½%; d/d U.K. GLASGOW: 1s. 0¼d. per lb. for 1 cwt. lots.

Citric Acid.—1s. 2d. per lb. MANCHESTER: 1s. 6d.

Copper Sulphate.—About £29 10s. per ton f.o.b. MANCHESTER: £29 10s., less 2%, in 5 cwt. casks f.o.b. Liverpool.

Cream of Tartar.—100%, 252s. per cwt., less 2½%, d/d in sellers' returnable casks.

Formaldehyde.—£21 15s. to £25 per ton d/d. MANCHESTER: 40%, £22 to £25 per ton in casks d/d; imported material dearer.

Formic Acid.—85%, £47 per ton for ton lots, carriage paid, carboys returnable; smaller parcels quoted up to 50s. per cwt., ex store.

Glycerine.—Chemically pure, double distilled 1260 s.g., in tins, £3 15s. to £4 15s. per cwt., according to quantity; in drums, £3 7s. 6d. to £4 1s. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 6s. 3½d. to 8s. 9½d. carboy d/d, according to purity, strength and locality.

Iodine.—Resublimed B.P., 9s. 11d. to 13s. 11d. per lb., according to quantity.

Lactic Acid.—Dark tech., 50% by vol., £37 10s. per ton; 80% by weight, £79; pale tech, 50% by vol. £44; 80% by weight, £86. Not less than one ton lots ex works; barrels returnable, carriage paid.

Lead Acetate.—White, £46 10s. to £48 10s. ton lots. MANCHESTER: £46 to £48 per ton.

Lead Nitrate.—About £45 10s. per ton d/d in casks.

Lead Red.—English, 5/10 cwt., £43 10s.; 1 cwt. to 1 ton, £43 5s.; 1/2 tons, £43; 2/5 tons, £42 10s.; 5/20 tons, £42; 20/100 tons, £41 10s.; over 100 tons, £41 per ton, less 2½ per cent., carriage paid; non-setting red lead 10s. per ton dearer in each case.

Lead White.—Dry English, less than 5 tons, £55; 5/15 tons, £51; 15/25 tons, £50 10s.; 25/50 tons, £50; 50/200 tons, £49 10s. per ton, less 5 per cent., carriage paid; Continental material, £1 per ton cheaper. Ground in oil, English, 1/5 cwt., £63 10s.; 5/10 cwt., £62 10s.; 10 cwt. to 1 ton, £62; 1/2 tons, £60 10s.; 2/5 tons, £59 10s.; 5/10 tons, £57 10s.; 10/15 tons, £56 10s.; 15/25 tons, £56; 25/50 tons, £55 10s.; 50/100 tons, £55 per ton, less 5 per cent., carriage paid.

Litharge.—1 to 2 tons, £41 10s. per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £14 to £17 per ton

Magnesium Chloride.—Solid (ex wharf), £12 to £13 per ton. MANCHESTER: £13 to £14 per ton.

Magnesium Sulphate.—Commercial, £10 to £12 per ton, according to quality, ex works.

Mercury Products.—Controlled price for 1 cwt. quantities: Bichloride powder, 11s. 7d.; bichloride lump, 12s. 2d.; ammon chloride powder, 13s. 5d.; ammon. chloride lump, 14s; mercurous chloride, 13s. 9d.; mercury oxide, red cryst., B.P., 15s.; red levig. B.P., 15s. 6d.; yellow levig. B.P., 14s. 9d.; yellow red, 14s. 4d.; sulphide, red, 12s. 11d.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 2s. 0½d. per gal.; pyridinised 64° O.P. 100 gals., 2s. 5d. per gal.

Nitric Acid.—£23 to £31 per ton ex works.

Oxalic Acid.—From £60 per ton for ton lots, carriage paid, in 5-cwt. casks; smaller parcels would be dearer; deliveries slow.

Paraffin Wax.—Nominal.

Potash, Caustic.—Basic price for 50-100 ton lots. Solid, 88/92%, commercial grade, £53 15s. per ton, c.i.f. U.K. port, duty paid. Broken, £5 extra; flake, £7 10s. extra; powder, £10 extra per ton. Ex store, £3 10s. supplement.

Potassium Bichromate.—Crystals and granular 8d. per lb.; ground 7d. per lb., carriage paid. MANCHESTER and GLASGOW: 7d. per lb. in orig. casks.

Potassium Carbonate.—Basic prices for 50 to 100 ton lots: hydrated, 83/85%, £46 17s. 6d. per ton; calcined, 98/100%, £52 10s. per ton, c.i.f. U.K. port. Ex warehouse, £3 10s. extra per ton.

Potassium Chlorate.—Imported powder and crystals, ex store London, 2s. per lb.

Potassium Iodide.—B.P., 8s. 8d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, **£26 to £30 per** ton ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 5½d. per lb. for 1 cwt. lots; commercial, £7 9s. 6d. to £8 1s. 6d. per cwt., according to quantity d/d.

Potassium Prussiate.—Yellow, about 1s. 3d. to 1s. 5d. per lb., supplies scarce.

Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £19 10s. per ton, in casks, ex store.

Soda, Caustic.—Solid, 76/77% spot, £14 17s. 6d. per ton d/d station.

Soda Crystals.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

Sodium Acetate.—£40 per ton, ex wharf.

Sodium Bicarbonate (refined).—Spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 5⅝d. per lb., anhydrous, 6d. per lb. net d/d U.K. MANCHESTER and GLASGOW: 5⅜d. per lb., in orig. casks.

Sodium Bisulphite Powder.—60/62%, £17 10s. per ton d/d in 2-ton lots for home trade.

Sodium Carbonate Monohydrate.—£21 per ton d/d in minimum ton lots in 2 cwt. free bags.

Sodium Chlorate.—£36 to £40 per ton, d/d, according to quantity.

Sodium Hyposulphite.—Pea crystals, £19 15s. per ton for 2-ton lots; commercial, £14 10s. per ton. MANCHESTER: Commercial, £14 10s.; photographic, £19 15s.

Sodium Iodide.—B.P., for not less than 28 lb., 9s. 6d. per lb.; for not less than 7 lb., 13s. 1d. per lb.

Sodium Metasilicate.—£14 5s. per ton, d/d U.K. in cwt. bags.

Sodium Nitrate.—Refined, £13 10s. per ton for 2-ton lots d/d

Sodium Nitrite.—£24 per ton for ton lots.

Sodium Perborate.—10%, £5 2s. per cwt.

Sodium Phosphate.—Di-sodium, £19 to £22 per ton d/d for ton lots. Tri-sodium, £25 to £27 per ton d/d for ton lots.

Sodium Prussiate.—From 7½d. per lb. ex store.

Sodium Silicate.—£8 17s. 6d. to £9 10s. per ton, for 4-ton lots.

Sodium Sulphate (Glauber Salts).—£4 10s. per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. Spot £4 13s. 6d. per ton d/d station in bulk. MANCHESTER: £4 13s. 6d. per ton d/d station.

Sodium Sulphide.—Solid 60/62%, Spot, £17 5s. per ton d/d in drums; crystals, 30/32%, £12 12s. per ton d/d in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; Pea crystals, spot, £18 10s. per ton d/d station in kegs; commercial, £12 15s. per ton d/d station in bags.

Sulphur.—Finely powdered, £18 10s. per ton d/d; precip. B.P., 68s. per cwt.

Sulphuric Acid.—168° Tw., £6 10s. to £7 10s. per ton; 140° Tw., arsenic-free, £4 11s. per ton; 140° Tw., arsenious, £4 3s. 6d. per ton. Quotations naked at sellers' works.

Tartaric Acid.—3s. 0½d. per lb., less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 3s. 0½d. per lb.

Zinc Oxide.—Maximum prices: White seal, **£30 17s. 6d. per ton;** red seal, £28 7s. 6d. d/d; green seal, £29 17s. 6d. d/d buyers' premises.

Zinc Sulphate.—Tech., about £25, carriage paid, casks free.

Rubber Chemicals

Antimony Sulphide.—Golden, 11½d. to 2s. per lb. Crimson, 1s. 8½d. to 2s. per lb.

Arsenic Sulphide.—Yellow, 1s. 10½d. to 2s. 2d. per lb.

Barytes.—Best white bleached, £8 3s. 6d. per ton.

Cadmium Sulphide.—5s. 8½d. to 6s. 6d. per lb.

Carbon Black.—5½d. to 8½d. per lb., according to packing.

Carbon Bisulphide.—£33 5s. to £38 5s. per ton, according to quantity, in free returnable drums.

Carbon Tetrachloride.—£46 to £49 per ton.

Chromium Oxide.—Green, **1s. 6d. per lb.**

India-rubber Substitutes.—White, 5 15/16d. to 9d. per lb.; dark, 5 9/16d. to 8½d. per lb.

Lithopone.—30%, £25 per ton; 60%, £31 to £32 per ton. Imported material would be dearer.

Mineral Black.—£10 to £14 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£45 per ton.

Vermilion.—Pale or deep, 13s. 8d. per lb., for 7 lb. lots and less.

Plus 5% War Charge.

Nitrogen Fertilisers

Ammonium Phosphate Fertilisers.—Type B, £13 18s. 9d. per ton in 6-ton lots, d/d farmer's nearest station in July.

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station: July delivery, £9 10s. Increase of 1s. 6d. per ton for every month up to £10 0s. 6d. in February, 1942; March/June, 1942, £10 2s. Rebate of 28s. per ton on present bookings for July/December delivery.

Calcium Cyanamide.—Nominal: **supplies very scanty.**

Concentrated Complete Fertilisers.—£14 8s. 9d. per ton in 6-ton lots, d/d farmer's nearest station in July. Supplies small except C.C.F. Special.

"Nitro-Chalk."—£9 14s. per ton in 6-ton lots, d/d farmer's nearest station in July.

Sodium Nitrate.—Chilean, £13 10s. per ton in 2-ton lots, f.o.r. Liverpool; agricultural, £10 14s. per ton in 6-ton lots, d/d farmer's nearest station.

Coal Tar Products

Benzol.—Industrial (containing less than 2% of toluol), 2s. to 2s. 2d. per gal., ex works.

Carbolic Acid.—Crystals, 9½d. to 10⅜d. per lb.; Crude, 60's 3s. 3d. to 4s. 3d., according to specification. MANCHESTER: Crystals, 10½d. per lb., d/d; crude, 3s. 10d. to 4s., naked, at works.

Creosote.—Home trade, 5½d. to 5⅝d. per gal., f.o.r., maker's works; exports 6d. to 6½d. per gal., according to grade. MANCHESTER: 5½d. to 7¼ per gal.

Cresylic Acid.—Pale, 99/100%, 3s. to 3s. 6d. per gal. MANCHESTER: Pale, 99/100%, 3s. 3d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 4d. to 2s. 7d. per gal.; Heavy 90/190°, 1s. 10d., naked at works. MANCHESTER: 90/160°, 2s. 4d. to 2s. 8d.

Naphthalene.—Crude, whizzed or hot pressed, £14 per ton; purified crystals, £27 per ton in 2-cwt. bags; flaked, £27 per ton. Fire-lighter quality, £6 to £7 per ton ex works. MANCHESTER: Refined, £27 per ton.

Pitch.—Medium, soft, nominal, f.o.b. MANCHESTER: Nominal.

Pyridine.—90/140°, 17s. 6d. per gal.; 90/160°, 13s. 6d.; 90/180°, 4s. to 5s. per gal., f.o.b. MANCHESTER: 14s. to 18s. per gal.

Toluol.—Pure, 2s. 5d., nominal. MANCHESTER: Pure, 2s. 5d. per gal., naked.

Xylol.—Commercial, 3s. 7d. per gal.; pure, 3s. 9d. MANCHESTER: 3s. 4d. to 3s. 9d. per gal.

Wood Distillation Products

Calcium Acetate.—Brown, £21 per ton; grey, £24. MANCHESTER: Grey, £23.

Methyl Acetone.—40.50%, £54 per ton.

Wood Creosote.—Unrefined, 2s. per gal., according to boiling range.

Wood Naphtha, Miscible.—4s. 6d. to 5s. per gal.; solvent, 5s. per gal.

Wood Tar.—£4 to £5 per ton, acording to quality.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.

o-**Cresol** 30/31° C.—Nominal.

p-**Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 1s.

p-**Nitraniline.**—2s. 5d. per lb.

Nitrobenzene.—Spot, 5½d. per lb., in 90-gal. drums, drums extra, 1-ton lots d/d buyer's works.

Nitronaphthalene.—1s. 2d. per lb.; P.G., 1s. 0½d. per lb.

o-**Toluidine.—1s. per lb., in 8/10 cwt. drums, drums extra.**

p-**Toluidine.—2s. 2d. per lb., in casks.**

m-**Xylidine Acetate.—4s. 5d. per lb., 100%.**

Latest Oil Prices

LONDON.—July 10.—For the period ending August 2, per ton, net, naked, ex mill, works or refinery, and subject to additional charges according to package and location of supplies:—LINSEED OIL, raw, £41 10s. RAPESEED OIL, crude, £44 5s. COTTONSEED OIL, crude, £31 2s. 6d.; washed, £34 5s.; refined edible, £35 12s. 6d.; refined deodorised, £36 10s. SOYA BEAN OIL, crude, £33; refined deodorised, £37. COCONUT OIL, crude, £28 2s. 6d.; refined deodorised, £31 7s. 6d. PALM KERNEL OIL, crude, £27 10s.; refined deodorised, £30 15s. PALM OIL, refined deodorised, £37; refined hardened deodorised £41. GROUNDNUT OIL, crude, £35 10s.; refined deodorised, £40. WHALE OIL, crude hardened, 42 deg., £30 10s.; refined hardened, 42 deg., £33. ACID OILS.—Groundnut, £19; soya, £17; coconut and palm kernel, £22 10s. ROSIN, 32s. to 42s. per cwt., ex wharf, according to grade. TURPENTINE, 70s. per cwt., spot, American, including tax, ex wharf, in barrels, and ex discount.

LIVERPOOL.—July 9.—TURPENTINE, spot, American, 70s. per cwt.

COMPANY MEETING

British Alkaloids Limited

(Manufacturers of "T.C.P.")

Sales Maintained

The twelfth ordinary general meeting of British Alkaloids, Ltd., was held last Wednesday, July 9, in London.

Lt.-Col. Edward Gowland, D.S.O., M.B. (London), the chairman, presided, and in the course of his speech said:—You will have learned with regret of the death of Sir Ivor Philipps, who had been your chairman since the Company was incorporated in 1928. Sir Ivor was associated as chairman or director with many well-known companies, and the benefit of his ripe experience and wise counsel is sadly missed by me personally, as well as by my colleagues on the Board of your Company.

The year's working has resulted in a trading profit of £76,345, which, after charging £24,578 on account of Excess Profits Tax, leaves a net profit of £51,767.

Your Board now recommend the payment of final dividends of 8.09 per cent., less tax, on the 8 per cent. participating preference shares, making 16.09 per cent., less tax for the year, and 12 per per cent., less tax, on the ordinary shares, making 24 per cent., less tax, for the year.

Sales can be considered to have been satisfactory in the home market, despite the many difficulties with which we have had to contend during the year.

I am also happy to report that the expansion in export trade shown last year has been maintained, and this despite curtailed markets and a natural reduction in shipping facilities. The active and intelligent co-operation of our agents for these markets overseas is greatly appreciated, as well as their assistance in solving the many knotty problems that occur under war conditions.

War-Time Value of T.C.P.

As stated in the report, the war-time value of T.C.P. has been recognised by various Departments of H.M. Government, the London County Council, the British Red Cross and St. John Ambulance Brigade, as well as by hospitals all over the country and the great aeroplane and other industrial works whose fame is world-wide.

No less important is the rôle that T.C.P. continues to play in assisting to maintain the good health of thousands of members of the public—this is exemplified not only by the recommendation of satisfied users to their friends, but also by the fact that qualified pharmacists throughout the country, fully alive to the merit of T.C.P., lose no opportunity of recommending its use to their customers when indicated. In my opinion the availability of T.C.P. creates confidence in the public mind and may indeed be regarded as of very real national importance.

You will be interested to learn that a number of our employees are now serving with H.M. Forces, and the Board know that you will approve their action in supplementing their pay and allowances with a sum which will leave them as well situated financially as at the time of their enlistment, and I feel sure that you will wish to join with the Board in wishing them a speedy and safe return.

In conclusion I should like to express our appreciation of the way in which all members of the staff at the factory and at the office have carried out their duties during the year of unprecedented strain and difficulty—they have been magnificent.

The report was unanimously adopted.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Company Winding-Up Voluntarily

EUCALYPTUS PULP MILLS, LTD. (C.W.U.V., 12/7/41). By special resolution. Mr. Arthur Cecil Unthank, Alderman's House, Bishopsgate, London, E.C.2, appointed liquidator.

Declarations of Solvency

BRITISH NATURAL RESINS, LTD. (D.S., 12/7/41), London, E.C. June 16.

Receivership

UNIVERSAL EMULSIFIERS, LTD. (R., 12/7/41.) D. A. Clarke, 13 Basinghall Street, E.C., appointed receiver and manager on June 18.

Company News

Super Oil Seals and Gaskets, Ltd., have declared an interim dividend of 15 per cent. actual, less tax (same).

The Morgan Crucible Co., Ltd., announce a trading profit for the year to March 31 of £685,267, and have declared a final dividend of 6½ per cent., making 10 per cent. (8⅓ per cent.).

Ward Blenkinsopp & Co., Ltd. (354,672), have increased their nominal capital beyond the registered capital of £60,000 by the addition of £30,000 in £1 ordinary shares.

Metal Traders, Ltd., have acquired an additional subsidiary company, **Lead Pigments & Chemicals, Ltd.**, which has been taken over as a going concern.

The British Thermostat Co., Ltd., announce a final dividend of 11 per cent. on ordinary shares, making 18½ per cent. for the year (same). Net profits £34,595 (£63,978).

The Chloride Electrical Storage Co. announce a record profit for the year of £447,009, less tax, and have declared a final dividend on the "A" and "B" ordinary stock of 5 per cent., together with a bonus of 5 per cent., making 15 per cent.

Michael Nairn & Greenwich, Ltd. (which controls **Michael Nairn & Co.**), announce an interim dividend of 4 per cent. on ordinary shares. Last year's interim dividend, also 4 per cent., was followed by a final dividend of 8½ per cent., and a bonus of 1½ per cent.

Philip Harris and Co. (1913), Ltd., have declared a net profit for year to March 31 of £7,428 (£13,309), and announce a dividend of 4s. per share, free of tax (same, plus bonus of 2s. per share).

New Companies Registered

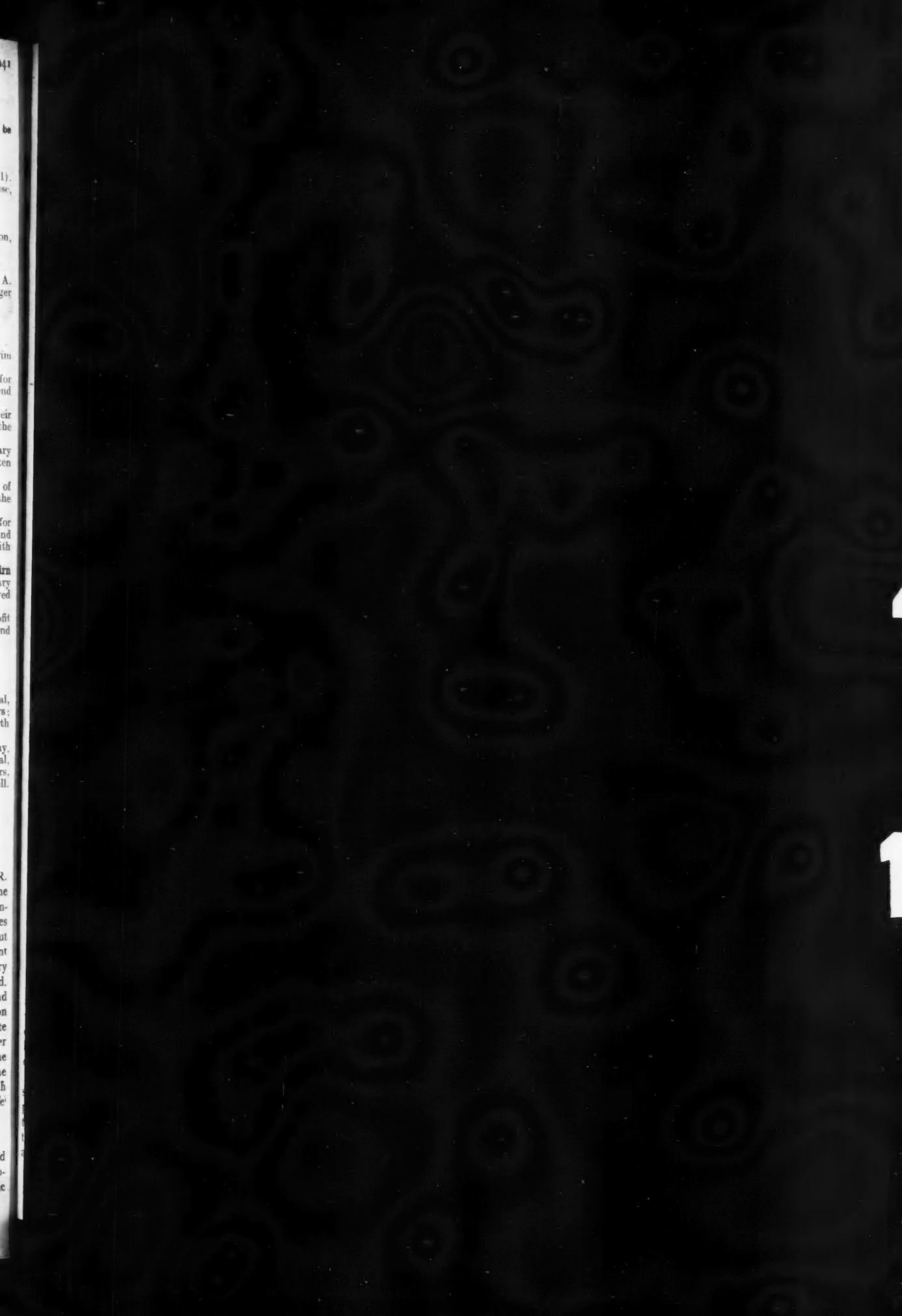
R & W Products, Ltd. (367,787).—Private company. Capital, £100 in 100 shares of £1 each. Manufacturing chemists. Directors: Ernest H. Robotham; Stanley E. Wright. Registered office: North Street, Littleover, Derby.

Turner Hill Engineering Co., Ltd. (637,852).—Private company. Capital: £500 in 500 shares of £1 each. Electrical, chemical, hydraulic and centrifugal and general engineers, metal workers, etc. Directors: Eric W. Mitchell and Mrs. Jessie G. Mitchell. Registered office: 132 Turners Hill, Cheshunt, Herts.

New Control Orders

Fertiliser Price Reductions

THE Control of Fertilisers Orders, Nos. 10 and 11 (S. R. and O. 1941 Nos. 907 and 908), have been issued by the Minister of Supply fixing maximum prices for sulphate of ammonia, superphosphate and compounds. The maximum prices of sulphate of ammonia are the same as for last season, but farmers who book their orders early will get a Government distribution allowance of 28s. per ton. The early delivery rebate on compounds has been increased from 1s. 6d. to 2s. 6d. per ton per month. The prices of phosphatic fertilisers and compounds are also lower than last season. The reduction in the case of superphosphate is 5s. and of ground phosphate 8s. 6d. per ton in bags, and the prices are reduced by a further 1s. 6d. where delivery is not made in bags supplied by the seller. These price reductions, which are also carried into the prices of compounds, are due to the use in connection with these fertilisers of the monies formerly applied to the basic slag subsidy.

Soft Soap Manufacture

Under an Order which came into force on July 7, and applies to existing stocks, the Ministry of Supply has prohibited the production of soft or liquid soap containing caustic potash or carbonate of potash except under licence.